### PCT

# WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau



### INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup>: H04Q 7/36, H01Q 3/02, 3/26

 $_{\mathbf{A3}}$ 

(11) International Publication Number:

WO 99/65262

(43) International Publication Date:

16 December 1999 (16.12.99)

(21) International Application Number:

PCT/SE99/01034

(22) International Filing Date:

10 June 1999 (10.06.99)

(30) Priority Data:

09/095,137

10 June 1998 (10.06.98) U

US

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors: MAZUR, Sara; Vikavägen 11, S-167 71 Bromma (SE). JOHANNISSON, Björn; Kaptensgatan 9, S-434 31 Kungsbacka (SE).

(74) Agent: ERICSSON RADIO SYSTEM AB; Ericsson Research, S-164 80 Stockholm (SE).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

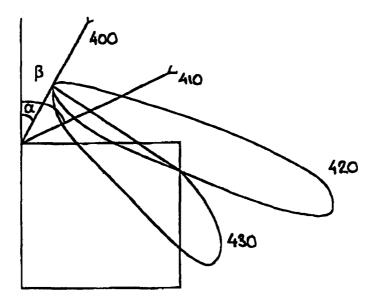
#### Published

With international search report.

(88) Date of publication of the international search report:

17 February 2000 (17.02.00)

(54) Title: METHOD AND MEANS FOR DOWNLINK ANTENNA PATTERN DOWNTILTING



#### (57) Abstract

In a cellular telecommunications network, a method and apparatus is disclosed for providing a substantial gain in downlink C/I by means of antenna pattern downtilt while still maintaining the coverage limiting signal strength in the uplink by the use of different antenna pattern downtilt for the transmit and receive antenna patterns.

### FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
ΑT	Austria	FR	France	LU	Luxembourg	SN	Senegal
ΑU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
BF	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

### INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01034

#### A. CLASSIFICATION OF SUBJECT MATTER

C. DOCUMENTS CONSIDERED TO BE RELEVANT

IPC7: H04Q 7/36, H01Q 3/02, H01Q 3/26
According to International Patent Classification (IPC) or to both national classification and IPC

#### **B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

### SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4881082 A (MOTOROLA INC.), 14 November 1989 (14.11.89), column 4, line 3 - line 6; column 7, line 1 - line 9; column 8, line 66 - column 9, line 53, figures 5,6,12, claims 13,22,26	1-40
X	EP 0531090 A2 (NIPPON TELEGRAPH AND TELEPHONE CORPORATION), 10 March 1993 (10.03.93), column 4, line 1 - line 49; column 6, line 40 - line 50, figures 5B,6B, abstract	1-40

Further documents are listed in the continuation of Box	C.	X See patent family annex.		
* Special categories of cited documents:  "A" document defining the general state of the art which is not considered to be of particular relevance		later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention		
				erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  "O" document referring to an oral disclosure, use, exhibition or other means		considered novel or cannot be considered to involve an inventive step when the document is taken alone		
		considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art		
				"P" document published prior to the international filing date but later than the priority date claimed  Date of the actual completion of the international search
"&" document member of the same patent family				
Date of mailing of the international search report				
		1 4 -12- 1999		
November 1999		, i 1000		
Name and mailing address of the ISA/		Authorized officer		
dish Patent Office				
Box 5055, S-102 42 STOCKHOLM		Per Källquist/cs		
Facsimile No. +46 8 666 02 86		Telephone No. + 46 8 782 25 00		
S di e cos cret	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance erlier document but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed  of the actual completion of the international search  November 1999 e and mailing address of the ISA/ dish Patent Office 5055, S-102 42 STOCKHOLM	Special categories of cited documents:  document defining the general state of the art which is not considered to be of particular relevance erlier document but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed  November 1999  e and mailing address of the ISA/  dish Patent Office  5055, S-102 42 STOCKHOLM  "T"  Authority  "A"  Authority  Per		

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/01034

	<u> </u>	C1/3L 33/01034	
C (Continu	ation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevan	it passages Relevan	nt to claim No.
X	WO 9637970 A1 (NOKIA TELECOMMUNICATIONS OY), 28 November 1996 (28.11.96), page 5, line 26 - line 35; page 8, line 32 - line 35; page 13, line 28 - page 14, line 9, figure 5, page 15, line 32 - page 16, line 15; page 17, line 3 - line 22; page 25, line 1 - line 9; page 32, line 24 - line 35		.0
P,A	WO 9917576 A1 (TELEFONAKTIEBOLAGET LM ERICSSON) 8 April 1999 (08.04.99), page 7, line 23 - page 9, line 6 - line 23; page 13, line 19 - line 30, claims 9,15, page 15, l	line 36;	0
A	WO 9750272 A2 (NORTHERN TELECOM LIMITED), 31 December 1997 (31.12.97), figures 3-4, page 6, 3 par page 7, 1 par.	1-4	10
P,A	 US 5818385 A (D.E. BARTHOLOMEW), 6 October 1998 (06.10.98), column 3, line 44 - line 53; co	olumn 7,	10
	line 24 - line 30; column 19, line 60 - col line 32, figure 5, column 36, line 48 - lin column 40, line 52 - line 57; column 45 - c 46; column 50, line 13 - line 28	e 52;	
A	WO 9617404 A1 (NORTHERN TELECOM LIMITED), 6 June 1996 (06.06.96), page 1, line 11 - page 1, line 28 - page 2, line 4; page 2,	ine 15;	10
	line 21 - page 3, line 2 		_
A	EP 0847209 A2 (NORTHERN TELECOM LIMITED), 3 December 1997 (03.12.97), column 2, line 5 - line 15; column 3, line 57 - colum line 2; column 5, line 18 - line 21, claim column 7, line 54 - line 57		10

#### INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

06/06/98

11/05/99

PCT/SE 99/01034 02/11/99 Patent family member(s) Patent document Publication Publication cited in search report date date US 4881082 A 14/11/89 1285030 A 18/06/91 CA JP 1255325 A 12/10/89 JP 2927813 B 28/07/99 0531090 A2 10/03/93 JP 13/09/99 EP 2949533 B JP 5063634 A 12/03/93 US 5551060 A 27/08/96 WO 9637970 A1 28/11/96 ΑU 707721 B 15/07/99 5820896 A AU 11/12/96 CN 1157066 A 13/08/97 EP 0772919 A 14/05/97 FI 98171 B,C 15/01/97 FΙ 952532 A 25/11/96 07/04/98 JP 10503912 T 20/03/97 970300 A NO WO 9917576 A1 08/04/99 AU 9371698 A 23/04/99 9750272 A2 31/12/97 WO AU 7615096 A 14/01/98 CA 2258889 A 31/12/97 14/04/99 EP 0908070 A US 5890067 A 30/03/99 US 5818385 A 06/10/98 NONE DE 69503805 D,T EP 0795211 A,B WO 9617404 A1 06/06/96 03/12/98 17/09/97 SE 0795211 T3 00/00/00 GB 9424119 D CA 2222001 A

US 5903826 A

EP 0847209 A2 03/12/97